

AMENDMENTS TO CLAIMS

Listing Of Claims

1. (currently amended) A method for packaging a semiconductor die comprising:

providing a leadframe;

providing a cyanoacrylate adhesive material formulated to cure in less than about 60 seconds in a temperature of about 20°C to 30°C and an ambient atmosphere;

providing a die attach machine configured to align the die to the leadframe, to apply the adhesive material to the leadframe or the die, and to press the die and the leadframe together with the adhesive material therebetween;

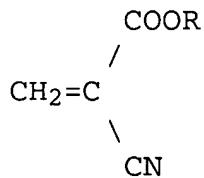
applying the adhesive material in viscous form to the leadframe or to the die using the die attach machine;

placing the die on the ~~leadframe~~ with the adhesive material using the die attach machine; and
~~in contact with the die and the leadframe to form an adhesive layer therebetween; and~~

polymerizing from 90-100% of the adhesive material without heating the die and the leadframe in less than about 60 seconds.

~~to cure the adhesive layer and bond the die to the leadframe.~~

2. (previously presented) The method of claim 1 wherein the adhesive material has the formula:



wherein R comprises a hydrocarbon group.

3. (previously presented) The method of claim 1 further comprising applying a catalyst to the leadframe, to the die, or to the adhesive material prior to the polymerizing step.

4. (previously presented) The method of claim 1 wherein the leadframe comprises a lead-on-chip leadframe.

5. (previously presented) The method of claim 1 further comprising providing a filler in the adhesive material.

6. (currently amended) A method for packaging a semiconductor die comprising:

providing a leadframe;
~~comprising a plurality of lead fingers;~~

providing a cyanoacrylate adhesive material formulated to cure in less than about 60 seconds at a temperature of about 20°C to 30°C and in an ambient atmosphere;

providing an in line dispensing mechanism configured to apply the adhesive material to the leadframe or the die;

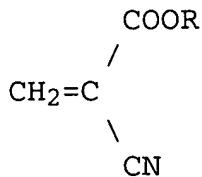
applying the adhesive material in viscous form to the ~~lead fingers~~ leadframe or to the die using the dispensing mechanism;

placing the die on the ~~lead fingers~~ leadframe with the adhesive material compressed between the die and the ~~lead fingers~~ leadframe to form an adhesive layer therebetween;
and

polymerizing from 90% to 100% of the adhesive material without heating the die and the leadframe in less than about 60 seconds to cure the adhesive layer and bond the die to the leadframe.

~~lead fingers,~~
~~wire bonding the die to the lead fingers; and~~
~~encapsulating the die.~~

7. (previously presented) The method of claim 6 wherein the adhesive material has the formula:



wherein R comprises a hydrocarbon group.

8. (currently amended) The method of claim 6 wherein the applying step dispensing mechanism comprises a method mechanism selected from the group consisting of a syringe dispensing mechanism, a stenciling mechanism, a dip coating mechanism, a spraying mechanism, and a dot shooting mechanism.

9. (currently amended) The method of claim 6 wherein the applying step comprises forming dispensing mechanism is configured to form a plurality of dots of the adhesive material on the leadframe.
lead fingers.

10. (previously presented) The method of claim 6 wherein the adhesive material includes an electrically conductive filler comprising a material selected from the group consisting of Ag, Ni and Fe.

11. (previously presented) The method of claim 6 further comprising applying a catalyst to the leadframe, to the die, or to the adhesive material prior to the polymerizing step.

12. (currently amended) A method for packaging a semiconductor die comprising:

~~providing a leadframe comprising a mounting paddle; comprising a plurality of lead fingers;~~

~~applying providing~~ an adhesive material in viscous form ~~on the lead fingers or on the die, the adhesive material~~ comprising a cyanoacrylate adhesive formulated to cure in less than about 60 seconds at a temperature of about 20°C to 30°C and in an ambient atmosphere;

~~, and an electrically insulating filler;~~

providing a die attach machine configured to align the die to the mounting paddle, to apply the adhesive material to the mounting paddle and to press the die and the mounting paddle together with the adhesive material therebetween;

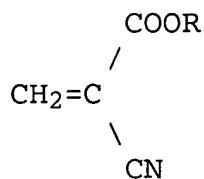
applying the adhesive material to the mounting paddle using the die attach machine;

~~placing the die on the lead fingers with the adhesive material using the die attach machine; and in contact with the die and the lead fingers to form an adhesive layer therebetween; and~~

~~polymerizing from 90-100% of the adhesive material without heating the die and the leadframe at the temperature and in the ambient atmosphere in less than about 60 seconds, to cure the adhesive layer and bond the die to the lead fingers.~~

13. (currently amended) The method of claim 12 further comprising applying a catalyst to the ~~lead fingers leadframe~~, to the die or to the adhesive material prior to the polymerizing step.

14. (previously presented) The method of claim 12 wherein the adhesive material has the formula:

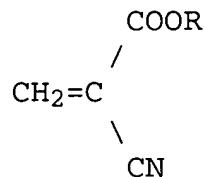


wherein R comprises a hydrocarbon group.

15. (currently amended) A method for packaging a semiconductor die comprising:

providing a leadframe;

providing an adhesive material having the formula:



wherein R is a hydrocarbon group, the adhesive material formulated to cure in less than about 60 seconds at a temperature of about 20°C to 30°C and in an ambient atmosphere;

~~providing a filler in the adhesive material selected to tailor a characteristic of the adhesive material;~~

providing a system comprising a leadframe feed mechanism configured to manipulate the leadframe, a vacuum tool configured to manipulate the die, an alignment device configured to align the die to the leadframe, and a dispensing mechanism configured to dispense the adhesive material on the leadframe or the die;

applying the adhesive material in a viscous form to the leadframe or to the die using the leadframe feed mechanism and the dispensing mechanism;

placing the die on the leadframe with the adhesive material compressed between the die and the leadframe using the vacuum tool and the alignment device; and

~~to form an adhesive layer therebetween;~~

polymerizing from 90-100% of the adhesive material without heating the die and the leadframe in less than about 60 seconds.

~~to cure the adhesive layer and bond the die to the leadframe;~~

~~wire bonding the die to the lead frame; and
encapsulating the die.~~

16. (currently amended) The method of claim 15 wherein the system comprises a die attach machine. ~~further comprising following the applying step, applying a catalyst to the leadframe or to the die.~~

17. (currently amended) The method of claim 15 wherein the adhesive material comprises a filler ~~comprises~~ comprising a material selected from the group consisting of SiO₂, Al₂O₃, AlN, Ag, Ni, Fe, SiC, and polystyrene coated Ni.

18. (previously presented) The method of claim 15 wherein the leadframe comprises a mounting paddle for supporting the die and the applying step comprising applying the adhesive material to the mounting paddle.

19. (previously presented) The method of claim 15 wherein the leadframe comprises a lead-on-chip leadframe comprising a plurality of lead fingers configured for wire bonding to the die and for supporting the die.

20. (currently amended) The method of claim 15 wherein the applying step comprises a method dispensing mechanism ~~comprises a mechanism~~ selected from the group consisting of a syringe dispensing mechanism, a stenciling

mechanism, a dip coating mechanism, a spraying mechanism, and a dot shooting mechanism.

21. (currently amended) A method for packaging a semiconductor die comprising:

providing a leadframe;

providing an adhesive material comprising an anaerobic acrylic formulated to cure in less than about 60 seconds at a temperature of about 20°C to 30°C and in an ambient atmosphere;

providing a die attach machine configured to align the die to the leadframe, to apply the adhesive material to the leadframe or the die, and to press the die and the leadframe together with the adhesive material therebetween;

applying the adhesive material in viscous form to the leadframe or to the die using the die attach machine;

placing the die on the leadframe with the adhesive material compressed between the die and the leadframe using the die attach machine; and

~~to form an adhesive layer therebetween; and~~

polymerizing from 90-100% of the adhesive material without heating the die and the leadframe in less than about 60 seconds.

~~to cure the adhesive layer and bond the die to the leadframe.~~

22. (previously presented) The method of claim 21 further comprising accelerating the polymerizing step using ambient humidity on the leadframe or the die.

Claims 23-39 (canceled)

40. (previously presented) The method of claim 21 further comprising applying a catalyst to the leadframe, to

the die, or to the adhesive material prior to the polymerizing step.

41. (previously presented) The method of claim 21 wherein the leadframe comprises a lead-on-chip leadframe comprising a plurality of lead fingers configured for wire bonding to the die and for supporting the die.

42. (currently amended) A method for packaging a semiconductor die comprising:

providing a lead-on-chip leadframe comprising a plurality of lead fingers configured to support the die and comprising a plurality of bonding sites;

providing an adhesive material comprising a cyanoacrylate adhesive or an anaerobic acrylic formulated to cure in less than about 60 seconds at a temperature of about 20°C to 30°C and in an ambient atmosphere;

providing a filler in the adhesive material selected to tailor a characteristic of the adhesive material;

providing a die attach machine configured to align the die to the leadframe, to apply the adhesive material to the lead fingers, and to press the die and the lead fingers together with the adhesive material therebetween;

applying the adhesive material in viscous form to the die or to the leadframe lead fingers using the die attach machine;

placing the die on the leadframe with the adhesive material in contact with the die and the lead fingers using the die attach machine;

~~to form an adhesive layer therebetween;~~

~~polymerizing from 90-100% of the adhesive material without heating the die and the leadframe at the temperature and in the ambient atmosphere in less than about 60 seconds; to cure the adhesive layer and bond the die to the lead fingers;~~

wire bonding the die to the bonding sites; and encapsulating the die and at least portions of the lead fingers.

43. (previously presented) The method of claim 42 wherein the filler comprises an electrically insulating material.

44. (previously presented) The method of claim 42 wherein the filler comprises an electrically conductive material.